## **Pacific Northwest Rail Corridor**

# **Everett to Blaine Commuter Rail Preliminary Feasibility Study**

**July 2001** 





#### **Acknowledgements:**

The study team would like to thank the following individuals for their assistance in preparing this report:

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Prepared by the Washington State Department of Transportation Public Transportation and Rail Division and Snohomish County Department of Public Works July 2001

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Prepared for the Washington State Department of Transportation and Snohomish County

by HDR Engineering, Inc.

**July 2001** 

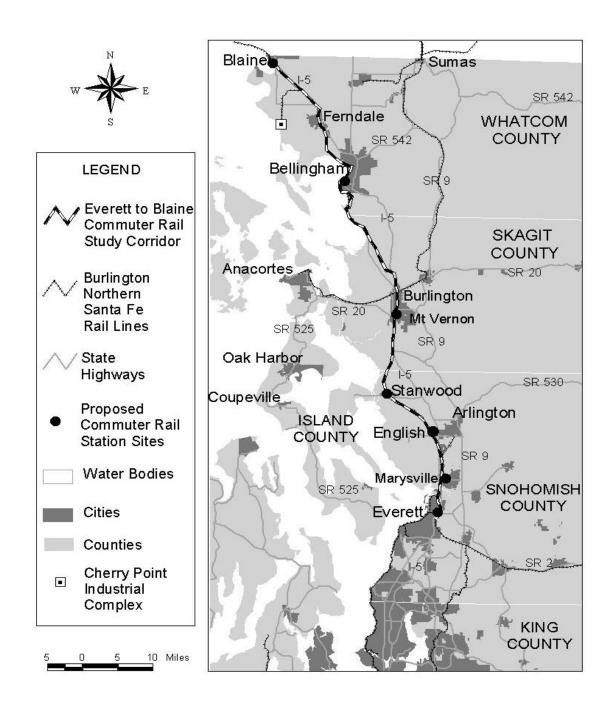




## **Table of Contents**

Commute	r Rail Study Area Map	ii
Executive	Summary	iii
	What is the purpose of this preliminary feasibility study?	iii
	What next steps are recommended?	iv
<b>Chapter O</b>	ne – Introduction	1
	Why can't commuter rail service just be added to the rail line today? What is the purpose of this preliminary feasibility study? What area was studied?	2
	What area was studied? Who sponsored the study and who was involved? How is this report organized?	3
Chapter T	wo – Background	5
	Is there traffic congestion in North Sound?	5
Chapter T	hree – Characterisitics of Commuter Rail Service	7
•	What is commuter rail and how does it differ from Amtrak service? What type of commuter rail service was envisioned in this study?	7 8
	When would trains operate?	
	How fast would commuter trains travel?	
	How would travelers arrive and depart from stations?	9
Chapter F	our – Station Sites	
onapioi i	How were station sites selected?	13
	What communities were assumed to have a commuter rail station?	13
Chapter F	ive – System Operations and Constraints	.19
	What are general railroad characteristics?	19
	How do these characteristics affect the ability to add more trains?	
	How many trains can the study area accommodate in any given day?	
	Where are the "chokepoints" in the corridor located?	
Chapter S	ix – Ridership	
	What did the ridership estimation reveal?	25
	even – Comparable Commuter Rail Systems and r Rail New Starts	.27
Chapter F	ight – Conclusions and Next Steps	.29
apto: <b>-</b>	What is the purpose of this preliminary feasibility study?	29
	What did the feasibility study find?	29
	What next steps are recommended?	30

### **Commuter Rail Study Area Map**



## **Executive Summary**

There is local interest in commuter rail transit service north of Everett to Blaine. This is in part due to:

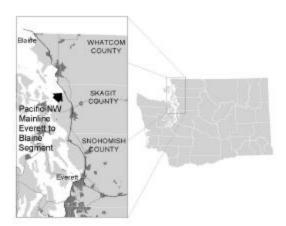
- concerns about growing traffic congestion;
- recent rapid population growth and growth projections;
- increasing congestion at the US/Canada border and the contributions commuters make to this congestion; and
- the recent success of Sound Transit's Sounder commuter rail service and Amtrak *Cascades* intercity rail passenger service.

This local interest led policymakers to provide state and local money for this preliminary analysis of commuter rail in the North Sound Area.

#### What is the purpose of this preliminary feasibility study?

The purpose of the Everett to Blaine Commuter Rail Preliminary Feasibility Study is to provide information about whether commuter rail service between Everett and Blaine could be a meaningful component of the North Sound region's future transportation system. This preliminary feasibility study was conducted to:

- assess whether riders might be attracted to commuter rail service;
- identify and evaluate potential station sites; and
- provide general analysis of the ability of the rail system to accommodate commuter rail and the effect of commuter rail service on existing and planned rail freight operation and Amtrak *Cascades* service.



#### What did the feasibility study find?

- This preliminary study concludes that if travel conditions deteriorate on Interstate 5 as predicted, there may be a viable market for commuter rail service by the year 2030, particularly in north Snohomish County. Other options, such as express bus service, or an extension of *Sounder* commuter rail service north of the city of Everett, could be considered as interim options to build ridership prior to 2030.
- The model used in this study has limitations due to the small budget and limited scope. Adequate local data is unavailable, such as 2020 or 2030 travel projections, commute patterns, land use, plus other relevant data. Nor does it consider the possible significant transportation demand from Canada. When additional information and funds become available, further exploration of commuter rail ridership should be undertaken.
- No fatal flaws were found at any of the seven station sites reviewed in the corridor.
- Significant rail improvements would be necessary to enhance capacity and increase train speeds before commuter rail service could be successfully initiated.

#### What next steps are recommended?

The study team recommends that relevant organizations:

- Study alternatives to commuter rail that could provide intercounty or regional transit options prior to 2030. Alternatives could include regional express bus service between the four counties; fast ferries; expanded van and carpool programs; special event trains such as Tulip Festival, Mariner, and Seahawk trains; and high-occupancy vehicle facilities.
- Study the possible extension of Sound Transit's *Sounder* commuter rail service north of Everett to English (Lakewood).
- Promote continued upgrades for the rail corridor between Everett and Blaine to improve Amtrak *Cascades* passenger-rail service.
- Work with relevant jurisdictions to establish a network of transit services and facilities, plus land uses that, over time, may provide a foundation for future regional transit and commuter rail service.
- Update the commuter rail ridership estimation model, when additional study funds and new data are available, and encourage the collection of local information for transportation studies.

## **Chapter One – Introduction**

There is local interest in commuter rail transit service north of Everett to Blaine. This is in part due to:

- concerns about growing traffic congestion;
- recent rapid population growth and growth projections;
- increasing congestion at the U.S./Canada border and the contributions commuters make to this congestion; and
- the recent success of Sound Transit *Sounder* commuter rail service and Amtrak *Cascades* intercity rail passenger service.

This local interest led policymakers to provide state and local money for this preliminary analysis of commuter rail in the North Sound Area.

During the past decade, Washington State worked with Oregon, Amtrak, Burlington Northern and Santa Fe Railway (BNSF), and local communities to develop dramatically improved Amtrak intercity rail passenger service. This service, called the Amtrak *Cascades*, now operates from Vancouver, BC via Seattle and Portland to Eugene, Oregon. Sound Transit introduced Tacoma-Seattle *Sounder* commuter rail service in 2000, and plans to expand the service north to Everett in the next few years.

While expansion is planned for both *Sounder* and Amtrak *Cascades* rail service, these will not offer workable commuter service for North Sound residents.

Amtrak *Cascades* service is designed for intercity travel, typically trips of 150 miles. These trains are popular with travelers who take longer trips. In fact, the Amtrak *Cascades* service diverts more than 40 million vehicle miles of traffic from highways annually. However, intercity trains like the Amtrak *Cascades* don't offer the frequency, schedules, or ticket prices workday commuters need.

Although Sound Transit plans to expand *Sounder* commuter rail service north to Everett in the next few years, there are, however, currently no plans to take this service to communities north of Everett.

# Why can't commuter rail service just be added to the rail line today?

The track under consideration in this study is owned and operated by the BNSF. It accommodates both short- and long- haul freight train service and Amtrak passenger service.

Railroads will typically consider adding passenger train service to their systems only if there is available capacity to accommodate these trains on their tracks. Given current levels of freight and passenger rail traffic on this main line, regular commuter rail service could not be added without significantly disrupting existing services. While some capacity may be available on some segments of the track, it is not always consistent with the time periods that are necessary for commuter rail. It is likely that the route would need to be upgraded significantly to serve commuter rail trains.

In addition, no institution or agency has the authority or is provided money to develop and operate commuter rail in the North Sound area. Even if money to develop commuter rail were available, it would take a minimum of four years to complete the necessary engineering and planning studies and environmental documentation, and obtain the necessary construction permits, complete track and safety upgrades, manufacture train equipment, and develop stations.

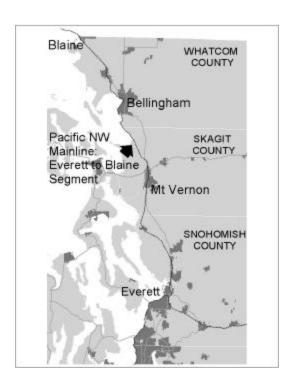
#### What is the purpose of this preliminary feasibility study?

The purpose of the Everett to Blaine Commuter Rail Preliminary Feasibility Study is to provide information about whether commuter rail service between Everett and Blaine could be a meaningful component of the North Sound region's future transportation system. This preliminary feasibility study was conducted to:

- assess whether riders might be attracted to commuter rail service;
- identify and evaluate potential station sites; and
- provide general analysis of the ability of the rail system to accommodate commuter rail and the effect of commuter rail service on existing and planned rail freight operations and Amtrak Cascades service.

#### What area was studied?

This study assesses the BNSF Everett-Vancouver mainline from Blaine to Everett. This rail line runs approximately parallel to Interstate 5 and serves the same communities as the freeway.



### Who sponsored the study and who was involved?

The Washington State Department of Transportation was directed to work with local communities to conduct the study in the FY2001 Supplemental Transportation Budget. Snohomish County also contributed funding and staff time. Members of the "Farmhouse Gang," a consortium of representatives of North Sound cities, counties, transit agencies, port districts, community groups, and other organizations, provided data and represented community interests.

#### How is this report organized?

The report is presented in two parts. The first part of the report summarizes background information, technical analysis, and findings. The second part of the report presents three technical memoranda:

- 1. Station site selection methodology and analysis;
- 2. Discussion of BNSF operations, planned track and safety improvements, and constraints that impede additional rail service on the line; and
- 3. Ridership estimation methodology and analysis.

## Chapter Two - Background

A variety of passenger and freight transportation systems and facilities serve the North Sound communities, helping the region grow and diversify economically. The region is served by:

- State, county, and local highways and roadways;
- Rail mainline and branch line tracks;
- Shortline railroads;
- Commercial airports;
- Ferry terminals and marine terminals;
- Transit service;
- Private shuttle services:
- Intercity bus service; and
- Intercity rail passenger service.

Bellingham's Fairhaven Station serves as the region's sole multi-modal transportation terminal. Two more are under construction in Everett and Mt. Vernon.

It is estimated that North Sound communities currently produce as many as 2.5 to 3.0 million daily trips. Of that total, between 300,000 and 400,000 daily trips are estimated to be "home-based-work trips" (i.e., trips between residences and places of work), most of which occur during peak travel hours.

### Is there traffic congestion in North Sound?

Yes. During peak commute periods average speeds are as low as 20 mph in North Snohomish County and as high as 50 to 60 mph on Interstate 5 in Whatcom County. Traffic congestion is projected to increase dramatically in the coming decades.

High occupancy vehicle facilities do not exist in the region. There is no cross-border public transit service for commuters. Some private companies offer intercity bus or shuttle service. Congestion at the US/Canada border is routine and driven by commute and leisure travel and commercial truck traffic.

# Is there a significant level of traffic crossing the US/Canadian border?

The transportation demand from north of the Washington – British Columbia border was only minimally considered in this report, though potential demand may be substantial. Recent studies, planning programs, and data gathering efforts were not available for this report; however, several efforts are currently being finalized and should be considered in future studies intended to forecast demands for commuter travel.

# Chapter Three – Characteristics of Commuter Rail Service

At least three different types of rail service would share the Burlington Northern and Santa Fe Railway (BNSF) mainline tracks if commuter rail were developed between Everett to Blaine: commuter rail, intercity rail passenger service (Amtrak *Cascades*), and freight rail. While they share some rail facilities, these types of rail services operate in different ways.

# What is commuter rail and how does it differ from Amtrak service?

Commuter rail service is typically oriented to the peak periods of commute travel (e.g., 6 a.m. -9 a.m. and 3:30 p.m. -6:30 p.m. on weekdays). The cost to use commuter rail is higher than traveling by urban transit services, but lower than traveling by Amtrak, and there are no reservations of tickets. Commuter rail trains typically accommodate a higher density of passengers and provide limited passenger amenities. Commuter trains make relatively frequent stops, as often as every five to ten miles. Average trip lengths are commuter length (i.e., 5 to 30 miles), reflecting the length of trip a commuter would be willing to make every day. The trip purposes for travelers using commuter rail are generally focused on home to work, or home/work to school, trips.

Amtrak service differs in many ways from commuter rail service. Amtrak service runs all day long, and on weekends and holidays. Prices of tickets are higher than commuter rail services, and reservations are required, reflecting infrequent use by individual patrons. Amtrak trains travel at higher speeds than commuter trains, and provide many amenities to travelers. This is necessary because the average trip lengths on Amtrak are rather long, and distances between stops are great. Typical trip purposes on Amtrak trains include visiting family and friends, business trips, recreational trips, and multiple purposes for senior citizen and young adult populations.

# What type of commuter rail service was envisioned in this study?

For the purposes of completing this analysis, a commuter rail service was conceptualized to assist in the evaluation:

- The near 86-mile long corridor was fitted with seven stations;
- Two separate operating schedules were considered. One accommodated three round trips in the morning and afternoon workday periods, and the other accommodated seven round trips in the morning and afternoon workday peak periods. These simulate hourly and 30-minute service in both directions. The 30-minute service is equivalent to many mature commuter systems in metropolitan areas throughout the U.S.; and
- Travel times reflect those typical of commuter rail, which would be slightly slower than tilt-technology trains used for Amtrak *Cascades* service.

### When would trains operate?

Commuter rail service typically operates during morning and evening workday peak commute hours. Mature commuter rail services can offer mid-day or weekend service as dictated by rail facilities, demand and funding. For the purpose of this analysis, only peak hour workday service was assessed. Tables III.1 and III.2 provide the commuter rail schedules that were developed for use in the ridership estimation process.

#### How fast would commuter trains travel?

The passenger train speed limit on the main-line track segment between Everett and Blaine is as high as 79 miles per hour in certain places. While some commuter train equipment is capable of traveling at this speed, the average speed would be significantly slower for a number of reasons.

There are numerous sections of track with lower speed limits due to track curvature, grades, and road crossings. Average speeds are also lower due to deceleration and acceleration before and after station stops.

The train speeds used for this analysis were based on the average travel speeds achieved by the *Sounder* service between Tacoma and Seattle. The most recent *Sounder* schedule projects a total end-to-end travel time of 60 to 61 minutes. This travel time translates into an average speed of 40 miles per hour over the entire length of the *Sounder* line.

This 40 mile-per-hour speed is assumed as the average speed for the proposed Everett to Blaine commuter rail line, translating into an end-to-end travel time of 128 minutes. While speeds would fluctuate between stations, this average speed value accounts for station stops, track characteristics, and track speed limits.

#### What kind of train equipment would be used?

For this analysis, it is assumed that commuter rail equipment similar to the equipment used by Sound Transit for its *Sounder* service between Tacoma and Seattle will be used. These trains are composed of bi-level passenger coaches, pulled by diesel locomotives. The trains are typically six to eight cars long and can accommodate approximately 140 passengers per car. The total passenger capacity of any single train would be between 800 and 1,150 passengers.

### How would travelers arrive and depart from stations?

An important element of any ridership estimation analysis is the time and means utilized to make connections to and from stations. Since a detailed analysis of these connections is beyond the scope of this study, the following assumptions were used to complete the analysis of commuter rail passenger trips over those segments:

- At Everett, a *Sounder* train would be available for an immediate transfer to and from Everett to Blaine commuter service;
- At all stations, immediate connections could be made to express bus operations, which would be timed-transfer operations with Everett to Blaine commuter service:
- Everett to Blaine commuter rail passengers using *Sounder* or express bus service would experience faster travel times (because of the fixed rail guide way and HOV lanes) than other commuters traveling on freeways;
- Pedestrian and bicycle facilities would be in place to provide seamless connections between commuter rail stations and adjacent employment centers and shopping facilities; and
- Wait time for commuter rail passengers would not exceed 15 minutes between the time a passenger arrived at a station and a train arrived.

# Table III.1 Commuter Rail Service Operating Schedule Used for Ridership Estimation (30-Minute Service Scenario)

SOUTHBOUND														
AM PEAK						PM PEAK								
Blaine	5:00am	5:30am	6:00am	6:30am	7:00am	7:30am	8:00am	3:30pm	4:00pm	4:30pm	5:00pm	5:30pm	6:00pm	6:30pm
Bellingham	5:27am	5:57am	6:27am	6:57am	7:27am	7:57am	8:27am	3:57pm	4:27pm	4:57pm	5:27pm	5:57pm	6:27pm	6:57pm
Mt. Vernon	6:05am	6:35am	7:05am	7:35am	8:05am	8:35am	9:05am	4:35pm	5:05pm	5:35pm	6:05pm	6:35pm	7:05pm	7:35pm
Stanwood	6:27am	6:57am	7:27am	7:57am	8:27am	8:57am	9:27am	4:57pm	5:27pm	5:57pm	6:27pm	6:57pm	7:27pm	7:57pm
English	6:44am	7:14am	7:44am	8:14am	8:44am	9:14am	9:44am	5:14pm	5:44pm	6:14pm	6:44pm	7:14pm	7:44pm	8:14pm
Marysville	6:57am	7:27am	7:57am	8:27am	8:57am	9:27am	9:57am	5:27pm	5:57pm	6:27pm	6:57pm	7:27pm	7:57pm	8:27pm
Everett	7:08am	7:38am	8:08am	8:38am	9:08am	9:38am	10:08am	5:38pm	6:08pm	6:38pm	7:08pm	7:38pm	8:08pm	8:38pm
NORTHBOUND														
AM PEAK								PM PEAK						
Everett	5:00am	5:30am	6:00am	6:30am	7:00am	7:30am	8:00am	3:30pm	4:00pm	4:30pm	5:00pm	5:30pm	6:00pm	6:30pm
Marysville	5:11am	5:41am	6:11am	6:41am	7:11am	7:41am	8:11am	3:41pm	4:11pm	4:41pm	5:11pm	5:41pm	6:11pm	6:41pm
English	5:24am	5:54am	6:24am	6:54am	7:24am	7:54am	8:24am	3:54pm	4:24pm	4:54pm	5:24pm	5:54pm	6:24pm	6:54pm
Stanwood	5:41am	6:11am	6:41am	7:11am	7:41am	8:11am	8:41am	4:11pm	4:41pm	5:11pm	5:41pm	6:11pm	6:41pm	7:11pm
Mt. Vernon	6:03am	6:33am	7:03am	7:33am	8:03am	8:33am	9:03am	4:33pm	5:03pm	5:33pm	6:03pm	6:33pm	7:03pm	7:33pm
Bellingham	6:41am	7:11am	7:41am	8:11am	8:41am	9:11am	9:41am	5:11pm	5:41pm	6:11pm	6:41pm	7:11pm	7:41pm	8:11pm
Blaine	7:08am	7:38am	8:08am	8:38am	9:08am	9:38am	10:08am	5:38pm	6:08pm	6:38pm	7:08pm	7:38pm	8:08pm	8:38pm

Table III.2

Commuter Rail Service Operating Schedule Used for Ridership Estimation (60-Minute Service Scenario)

Southbound											
AM PEAK						PM PEAK					
Blaine	5:00am	6:00am	7:00am	8:00am		3:30pm	4:30pm	5:30pm	6:30pm		
Bellingham	5:27am	6:27am	7:27am	8:27am		3:57pm	4:57pm	5:57pm	6:57pm		
Mt. Vernon	6:05am	7:05am	8:05am	9:05am		4:35pm	5:35pm	6:35pm	7:35pm		
Stanwood	6:27am	7:27am	8:27am	9:27am		4:57pm	5:57pm	6:57pm	7:57pm		
English	6:44am	7:44am	8:44am	9:44am		5:14pm	6:14pm	7:14pm	8:14pm		
Marysville	6:57am	7:57am	8:57am	9:57am		5:27pm	6:27pm	7:27pm	8:27pm		
Everett	7:08am	8:08am	9:08am	10:08am		5:38pm	6:38pm	7:38pm	8:38pm		
NORTHBOUND											
AM PEAK						PM PEAK					
Everett	5:00am	6:00am	7:00am	8:00am		3:30pm	4:30pm	5:30pm	6:30pm		
Marysville	5:11am	6:11am	7:11am	8:11am		3:41pm	4:41pm	5:41pm	6:41pm		
English	5:24am	6:24am	7:24am	8:24am		3:54pm	4:54pm	5:54pm	6:54pm		
Stanwood	5:41am	6:41am	7:41am	8:41am		4:11pm	5:11pm	6:11pm	7:11pm		
Mt. Vernon	6:03am	7:03am	8:03am	9:03am		4:33pm	5:33pm	6:33pm	7:33pm		
Bellingham	6:41am	7:41am	8:41am	9:41am		5:11pm	6:11pm	7:11pm	8:11pm		
Blaine	7:08am	8:08am	9:08am	10:08am		5:38pm	6:38pm	7:38pm	8:38pm		

## **Chapter Four – Station Sites**

The study team participated in a series of site visits to assess the suitability of station sites for the proposed Everett to Blaine commuter rail service. This evaluation does not represent a comprehensive site evaluation, nor was there public discussion of acceptable sites. Most of the station sites used for the analysis are simply surrogate locations to help simulate a commuter rail service that could be coded into the ridership estimation model to develop travel time and transportation demand estimates. The station sites used that are not surrogates are in Everett and Bellingham.

The following background information describes assumptions used in the ridership model and is intended to encourage community discussion about potential station site locations before more in-depth commuter rail studies and plans are initiated.

#### How were station sites selected?

In discussions with Snohomish County Department of Public Works and representatives of the project Technical Advisory Committee, seven stations were situated along the corridor. Criteria used to site stations included:

- Must have good traffic access and adequate land for parking;
- Must not hamper commuter, freight, or intercity passenger rail operations;
- Priority given to sites that offer multi-modal transportation connection opportunities, including existing Amtrak stations;
- Only one station in each city or community; and
- Stations must serve present or planned urban hubs at intervals consistent with typical US commuter rail systems.

## What communities were assumed to have a commuter rail station?

Applying the criteria, the seven station sites analyzed were located in Blaine, Bellingham, Mt. Vernon, Stanwood, English, Marysville, and Everett.

Several other locations were considered, including a station in Ferndale, downtown Bellingham, and Cook Road in central Skagit County. Each of these sites had advantages for commuter rail service and access by passengers, and should be further reviewed in any subsequent studies of commuter rail.

#### **Everett**

Site Location: New multimodal station at 32<sup>nd</sup> St. and Smith St.

Parking and access: Multimodal transportation center with good connections to transit and other rail services. including Amtrak and Sounder. Easy access to I-5. Park-andride lot at site.

Rail Operations: Train storage and parking represents an operational concern. Possible conflicts with Sounder and Amtrak operations in particular.



Environmental: No significant impacts expected.

#### Marysville

Site Location: 8<sup>th</sup> St. and Delta Ave.

Parking and access: Good access to I-5 and SR 528, though traffic congestion near the site may be a problem. Adjacent lots could be developed for parking, station, and platform.

Rail Operations: A siding exists on the west side of the mainline and could be used to separate trains at the station.

Environmental: No significant impacts expected.

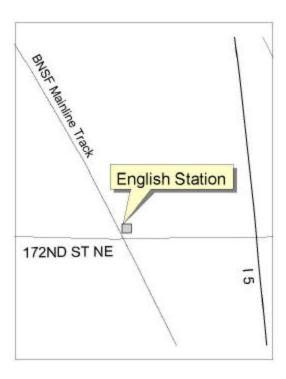


#### **English**

<u>Site Location</u>: South side of the Burlington Northern and Santa Fe Railway mainline at the intersection with SR 531 (172<sup>nd</sup> St.).

Parking and access: There is room to build a station, platform, and parking. The existing Ball Road could serve as a frontage road for the station site. Traffic backs up over an at-grade highway-rail crossing at 172<sup>nd</sup> St. and I-5, resulting in congested traffic flows.

<u>Rail Operations</u>: The two tracks at this site include a rail mainline on the east side and a



controlled siding to the west. Locating the station south of 172<sup>nd</sup> St. and west of the rail tracks would allow freight trains to use the English Siding without blocking passenger access to commuter trains.

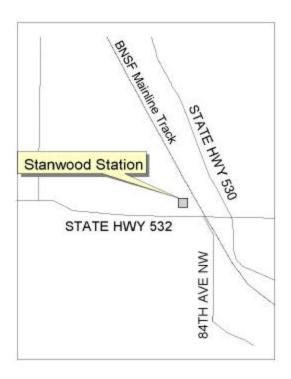
<u>Environmental:</u> There is a small creek located to the west side of the tracks, which can be avoided.

#### Stanwood

<u>Site Location:</u> North of the intersection between the rail mainline and SR 532 (271<sup>st</sup> St.)

Parking and access: Good access to SR 532 and Camano Island. The site has ample room for development, which would include a station, platform, and park-and-ride.

Rail Operations: The two tracks at this site include a rail mainline on the east side and a controlled siding to the west. Locating the station west of the tracks allows freight trains to use the siding without blocking passenger access to commuter trains.



Environmental: No significant impacts expected.

#### Mt. Vernon

Site Location: New transportation hub under construction in downtown Mt. Vernon.

Parking and access: Multimodal transportation center planned with good connections to transit and other rail services, including Amtrak. Easy access to I-5. If commuter rail service were added to this site, parking would need to be studied. Off-site parking should be considered in future studies.

<u>Rail Operations</u>: No major concerns at this site.



Environmental: No significant impacts expected.

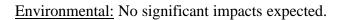
#### **Bellingham**

Site Location: Existing Fairhaven Station.

Parking and access: Existing multi-modal transportation hub with good connections to transit, marine terminal, intercity bus service, and Amtrak. The station and existing park-and-ride lot appear to be of adequate size to accommodate commuter rail service. Some additional parking may be required.

Rail Operations: A new platform on the west side of the

tracks may be needed to accommodate commuter rail operations and prevent conflicts with Amtrak trains.



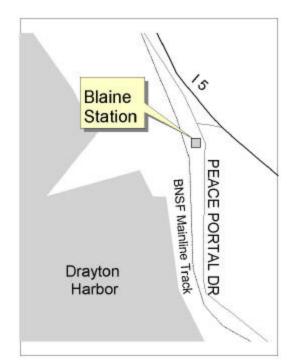


#### Blaine

Site Location: Current Burlington Northern and Santa Fe Railway depot adjacent to the intersection of the main line with Marine Drive.

Parking and access: The site is near I-5 with good road access. There is room to develop a station, platform and park-and-ride facility at the site.

Rail Operations: There is a mainline track at the site with a siding to the west, which means that the station, platform, and park-and-ride facilities should be developed to the east. US



Customs procedures currently performed at the site for Amtrak trains could cause an operational conflict.

Environmental: No significant impacts are expected.

# **Chapter Five – System Operations and Constraints**

The review and assessment of a rail corridor requires an understanding of the current physical and operational characteristics of the existing rail line. It can then be determined if the rail line can physically handle additional trains at the desired times.

The objective of this chapter is to discuss rail mainline operations; rail system committed and planned improvements; and rail system constraints.

#### What are general railroad characteristics?

While there are fundamental distinctions between the operations of a railroad and a highway network, some of the basic characteristics are similar (see Table V.1). Just as in highway construction, certain design standards (that dictate physical characteristics) are applied to rail construction. In both cases, the design standards are derived from the characteristics of the vehicles and the intended operation of the facility.

## Table V.1 Types of Railroad Capacity

Theoretical Capacity	The number of trains per day that could run over a route in a strictly perfect, mathematically generated environment. This number is useful because it is relatively easy to generate. For example, if the longest running time between two sidings were one hour, that implies that it would take at least two hours between trains to travel in each direction. This would imply a capacity of 12 trains traveling east and 12 trains traveling west, each day (or 24 trains per day).
Practical Capacity	It's not possible to actually run the number of trains you work out mathematically. Things will happen — one train doesn't have enough locomotive power, the rail is slippery, there is wind or fog, or the engineer is a little slow on his train handling. A reasonable and slightly reduced figure for what the real world might produce is 75 percent of the theoretical capacity. Using this relationship for practical capacity makes it possible to produce a reasonable estimate fairly easily.
Capacity	Commercial capacity is simply the practical capacity available during the times when business needs would actually want shipments to move. Practical capacity is the number of trains you could reasonably expect to run in a day, but using all of it would require you to run trains when you don't need them. Suppose that the Seattle area could practically accept one train an hour and send out one train per hour. However, shippers want to receive their shipments before 6 a.m. so they can be ready for the day's business, and they want to send shipments after a day of loading cars (say, after 6 p.m.).  In effect, the commercial capacity in this very simple example is six trains per day outbound from 6 p.m. to midnight and six trains per day inbound from midnight to 6 a.m. Shippers might want to increase their rail business to a level that would need ten trains, but since their businesses only accept or send out shipments at certain times, the commercial capacity is much less than the practical capacity.

# How do these characteristics affect the ability to add more trains?

In order to add more trains to a rail line, the tracks need to have the necessary capacity to handle the additional traffic. Capacity is simply the number of trains per day that a given rail line can safely move while meeting a particular schedule.

The rail characteristics presented in Table V.2 on the following pages explain how each element contributes to the operation of the rail line, thus, contributing to its capacity. Therefore, a review of current conditions along each route will provide enough information for a general feasibility assessment for new passenger service.

# How many trains can the study area accommodate in any given day?

Traffic over the corridor changes at two locations. South of Custer (Intalco) the volume of rail track is 50 percent greater than rail traffic demand to the north. This accounts for the rail traffic to and from the Cherry Point branch line. At Burlington, the rail traffic volume is 12 percent greater than train volume to the north. This accounts for the rail traffic to and from the Sumas and Anacortes branch lines.

The Burlington Northern and Santa Fe Railway currently operates an average of 14 one-way trains per day over this route, with 18 daily trains on peak days. Four of these one-way trains are Amtrak Cascades trains. The others are freight trains. Commuter rail service could not be added without constructing track and safety improvements to increase rail capacity.

### Where are the "chokepoints" in the corridor located?

According to railroad staff that operate and maintain the track within the study area, there are existing chokepoints in the study area. Improvements planned for Amtrak service are listed in the *Amtrak Cascades Plan for Washington State*<sup>1</sup>. Adding commuter rail would not only require these chokepoints to be alleviated, but would also require rail capacity improvements beyond those identified in the Amtrak *Cascades* plan. Additional study would be required to determine what rail improvements would be necessary for commuter service.

Existing chokepoints include:

- **Bridge 10 at Everett** which along with the severe curvature immediately south of the bridge restrict speeds to 10 MPH;
- Custer Intalco and the Cherry Point rail spur. The rail mainline tracks are currently used for switching operations. A 1.1-mile mainline realignment to accommodate increased Amtrak *Cascades* service is under construction. This project separates the Intalco switching operation from mainline freight and Amtrak operations;

<sup>&</sup>lt;sup>1</sup> Washington State Department of Transportation Rail Office, prepared by the Resource Group in association with HDR Engineering and Triangle Associates, 4/2000.

Table V.2
Railroad Characteristics and Their Relevance

CHARACTERISTIC	WHY IS IT IMPORTANT?
Track Structure	Track structure has three elements: rails, ties, and ballast. Rails are made of steel. Even though the steel is very hard, the rail wears out, just as highway pavement wears out. The ties, typically made of wood or concrete, support the rails. Ballast is crushed rock used to support the ties and keep the track in correct alignment while draining off precipitations. The condition of each of these elements dictates the weight and type of equipment that can be used on the line, as well as the speeds allowed on the line.
Number of Tracks	The number of tracks affects the capacity of the line. Two tracks (also called double track) have more capacity (the number of trains that can move through the area) than one track (single track).  Sidings also increase the capacity of a single track. A single-track line has auxiliary tracks known as sidings. Sidings are located along the line, which allows trains moving in opposite directions to pass each other and allows faster trains to overtake slower trains. The capacity of the rail line and the reliability of operation are affected by the time required to move between sidings.
Grade (The steepness of the track at various locations)	The steepness of the track dictates the types of trains that use the rail line. Typical grades for freight trains do not exceed 2 percent, while grades for passenger trains can be as high as 4 percent. Ruling grade is the predominant slope along the rail line. The ruling grade determines how many cars a locomotive can pull over the route.
Curves (Often presented in degrees of curvature)	The tightness of the curve dictates the speed that a train can travel through it. The higher the degree, the tighter the curve, the slower the speed.
Speed Limits	Train speed limits are derived by considering physics, safety, and regulations. They are generally regulated by the Federal Railroad Administration (FRA). The Code of Federal Regulations (49 CFR 213, Track Safety Standards) establishes classes of track with associated speed limits and detailed physical requirements for tracks in a given class. Speeds may also be restricted by the Washington Utilities and Transportation Commission (WUTC).
Traffic (Number and type of Trains)	The number and type of trains that can operate on a rail line relate directly to capacity. The more trains that are put on a track, the more the need for additional track, signals, and improved traffic control.
Signals and Traffic Control: Definition	Signals help extend the engineer's sight distance and therefore allow greater speeds. Traffic control determines which train can use which tracks to improve safety and ease movement of trains.

## Table V.2 --continued Railroad Characteristics and Their Relevance

Types of Signals and Traffic Control							
TYPE	DEFINITION AND USE						
Centralized Traffic Control (CTC)	Traffic control generally consists of an electronic system, usually associated with Automated Block Signals (ABS), or a manual block type system such as the Track Warrant Control (TWC) system.						
	Under CTC, the signal system lets a dispatcher at a central location see the location of all trains on a diagram of the tracks. The dispatcher can remotely arrange for one train to safely pass another. The logic built into the CTC system ensures that local wayside signals and track switches are properly set so that locomotive engineers know what the dispatcher intends for them to do in a safe manner.						
Yard Limit Operation (Yard Limit)	Yard limit operation is a mostly manual traffic control system used in yards and terminals. Trains must generally be prepared to stop within half the range of vision. Because of the great stopping distance of trains, yard limit operation generally requires movement at 20 mph or less.						
Occupancy Control System (OCS)	A traffic control system using a combination of yard limit operation and verbal instructions from the train dispatcher. OCS is generally limited to terminal areas where trains move at low to moderate speeds.						
Restricted Limits	A traffic control system generally allowing trains to use the main track and move as the way is seen to be clear. Similar, except in some details, to yard limit operation.						

- **English** siding needed to allow trains to safely pass. A 0.6-mile siding extension is under design to accommodate increased Amtrak service. The project will create a train meet site and a place to hold out trains from Everett to facilitate freight operations; and
- Bellingham the rail main line that travels through the Georgia Pacific plant includes a slow curvature and restricted speeds of 20 mph. This area also lacks a needed passing siding. A 0.8-mile mainline realignment project, which would separate Georgia Pacific plant switching operations from mainline freight and Amtrak trains, is in the planning stage. This project would accommodate increased Amtrak service.

## **Chapter Six – Ridership**

The ridership estimation process prepared for this Everett to Blaine preliminary feasibility study provides a general overview of whether or not there is a market for Everett to Blaine commuter rail service. The process to estimate ridership for new commuter rail is complex and involves comprehensive data about travel patterns and the market served by the service. The detailed data required, and the resources available to conduct a higher level of accuracy of ridership estimation, were not available for this study. Travel pattern and land use data were unavailable for the 2020 and 2030 forecast years. The 2020 and 2030 travel projections were interpolated by the consultant team. The method used for this estimation process is a sketch level planning method developed by the National Cooperative Highway Research Program<sup>2</sup>, which is a macrolevel method to help determine whether the service is worth examining in more detail. Any conclusion beyond this would be an exaggeration of the analysis and its results.

#### What did the ridership estimation reveal?

This preliminary analysis concludes that if travel conditions deteriorate on Interstate 5, as predicted, there may be a viable market for the Everett to Blaine commuter rail service by the year 2030.

The Everett to Blaine commuter rail service could generate as many as 1,400 daily one-way trips in the year 2020 and 8,300 daily one-way trips in the year 2030, as shown in Table VI.1 (half-hourly service scenario). These estimates represent less than one percent of all home-based work travel in the corridor. Moreover, this estimated ridership represents over 3 percent of all inter-zonal home-based work trips in the year 2030. These estimates also assume bi-directional commuter rail service every half hour at every station during morning and evening commute periods. The ridership estimate for the year 2020, while significant, is not great enough to merit the implementation of the proposed line at that time. However, the ridership estimate for the year 2030 may suggest enough demand to consider running the proposed half-hour service.

Projected ridership drops significantly if only hourly service is offered. While significant demand may exist by the year 2030, when as many as 2,100 one-way commuter rail trips may occur, as shown in Table VI.2, it is not enough demand to merit the implementation of the proposed hourly service at that time.

<sup>&</sup>lt;sup>2</sup> NCHRP Report 365: *Travel Estimation Techniques for Urban Planning*, Transportation Research Board, National Academy Press, Washington, DC, 1998.

Table VI.1
Half-Hourly Service Scenario: Ridership Estimates

	1998	2010	2020	2030
Potential Daily One-Way Trips	0	0	1,400	8,300
Percent of Total HBW Trips	0.00%	0.00%	0.02%	0.08%
Percent Inter-zonal HBW Trips	0.00%	0.00%	0.51%	3.34%

Notes: HBW – Home -based work

Inter-zonal – Trips that occur between zones in the corridor.

Table VI.2 Hourly Service Scenario: Ridership Estimates

	1998	2010	2020	2030
Potential Daily One-Way Trips	0	0	150	2,100
Percent of Total HBW Trips	0.00%	0.00%	0.00%	0.02%
Percent Inter-zonal HBW Trips	0.00%	0.00%	0.05%	0.87%

Notes: HBW – Home -based work

*Inter-zonal – Trips that occur between zones in the corridor.* 

The accompanying technical memorandum on the ridership estimation process provides additional detail into the variables that were used to complete the analysis, including the level of delay assumed for the trip to and from commuter rail stations, and how that compares with delays on the adjacent freeways, and the assumed "wait time" delay associated with the time spent at stations between trains.

# Chapter Seven – Comparable Commuter Rail Systems and Commuter Rail New Starts

In order to provide some context for evaluating commuter rail service, a brief review of recently implemented commuter rail systems was completed and is described below and summarized in Table VII.1. Each of these systems operates on a freight railroad's tracks and share the track with a variety of freight trains.

Altamont Commuter Express (ACE) – This commuter line, which began service in 1998, runs between Stockton, CA and San Jose, CA on Union Pacific Railroad tracks; a distance of approximately 72 miles. The service provided includes three inbound (westbound) morning trains, and three outbound (eastbound) afternoon/early evening trains between ten cities. The travel time for one complete one-way trip is 2 hours, 26 minutes on equipment capable of achieving maximum operating speeds of 95 mph, and connections are made with Amtrak and local transit providers. Operating costs are running approximately \$4.5 million/year, and the fare box recovery rate is estimated at 49 percent. According to ACE's Public Affairs Division, ridership averaged 1,900 to 2,000 riders daily during the spring quarter of 2001.

*Tri-Rail* – This Miami to Ft. Lauderdale service operates over a single-track freight line, which it shares with Amtrak and freight traffic. Construction is underway on double-track of the entire 72-mile long commuter rail system. Tri-Rail operates all day long (28 trains/day) and on weekends and holidays, and connects with the Metrorail rapid transit systems and other transit providers. Ridership is averaging about 7,500 to 8,000 daily riders, and the system connects with urban and suburban centers along the east coast of Florida, rather than into downtown Miami. Annual operating costs are approximately \$20 million, and the initial capital cost (including purchase of right-of-way) was \$323 million in 1989.

Coaster – Coaster is the 43-mile long commuter rail service between Oceanside, CA and San Diego, CA. It shares a single-track route with freight traffic and Amtrak trains, however, the underlying railroad is owned by the Metropolitan Transit Development Board, which it purchase from the Santa Fe Railroad in 1996 for \$406 million. Coaster operates 18 daily trains during both peak and off-peak periods and currently serves about 3,500 passengers/day. Startup capital costs, including right-of-way, were \$162 million, and operating costs are approximately \$3.5 million.

West Coast Express – Located in Vancouver, British Columbia, the West Coast Express operates 10 trains/peak period on track owned by Canadian Pacific Rail. The 40-mile long service makes stops at eight stations between suburban centers east of downtown and downtown areas. West Coast Express initiated service in 1995 with capital costs of approximately \$133 million Canadian and uses leased locomotives and double-deck coaches. Over 6,100 passengers use West Coast Express each day, which provides timed-transfer connections with other transit services.

Sounder – The 82-mile Sounder service began in September 2000 between Tacoma and Seattle (seven station stops), and currently runs two northbound trains in the morning peak period and two southbound trains in the afternoon peak period. When new signal and track work is completed (expected year 2003), Sounder service will expand between Tacoma and Lakewood, and between Seattle and Everett (adding six more stops). Moreover, more trains will be added to the schedule — planned to 18 trains/day between Lakewood-Tacoma-Seattle, and 12 trains/day between Seattle and Everett. Despite its recent start up date and relatively limited service schedule, Sounder is considered to be a very successful service, carrying an average of 2,477 passengers/day in the second week of July 2001.

Table VII.1

Hourly Service Scenarios: Current Ridership Estimates

			No. of	Trains/	Daily
	Start Date	Miles	Stations	Day	Ridership
ACE	1998	72	10	6	2,000
Coaster	1997	43	8	18	3,500
Sounder	2000	82	7	4	2,500
Tri-Rail	1989	72	15	28	8,000
West Coast Express	1995	40	8	20	6,100
Everett-Blaine	na	86	7	28	na

na – not applicable

## **Chapter Eight – Conclusions and Next Steps**

#### What is the purpose of this preliminary feasibility study?

The purpose of the Everett to Blaine Commuter Rail Preliminary Feasibility Study is to provide information about whether commuter rail service between Everett and Blaine could be a meaningful component of the North Sound region's future transportation system. This preliminary feasibility study was conducted to:

- assess whether riders might be attracted to commuter rail service;
- identify and evaluate potential station sites; and
- provide general analysis of the ability of the rail system to accommodate commuter rail and the effect of commuter rail service on existing and planned rail freight operation and Amtrak *Cascades* service.

#### What did the feasibility study find?

- This preliminary study concludes that if travel conditions deteriorate on Interstate 5 as predicted, there may be a viable market for commuter rail service by the year 2030, particularly in north Snohomish County. Other options, such as express bus service, or an extension of *Sounder* commuter rail service north of the City of Everett, could be considered as interim options to build ridership prior to 2030.
- The model used in this study has limitations due to the small budget and limited scope. Adequate local data is unavailable, such as 2020 or 2030 travel projections, commute patterns, land use, plus other relevant data. Nor does it consider the possible significant transportation demand from Canada. When additional information and funds become available, further exploration of commuter rail ridership should be undertaken.
- No fatal flaws were found at any of the seven station sites reviewed in the corridor.
- Significant rail improvements would be necessary to enhance capacity and increase train speeds before commuter rail service could be successfully initiated.

#### What next steps are recommended?

The study team recommends that relevant organizations:

- Study alternatives to commuter rail that could provide intercounty or regional transit options prior to 2030. Alternatives could include regional express bus service between the four counties; fast ferries; expanded van and carpool programs; special event trains such as Tulip Festival, Mariner, and Seahawk trains; and high-occupancy vehicle facilities.
- Study the possible extension of Sound Transit's *Sounder* commuter rail service north of Everett to English (Lakewood).
- Promote the continued upgrades for the rail corridor between Everett and Blaine to improve Amtrak *Cascades* passenger-rail service
- Work with relevant jurisdictions to establish a network of transit services and facilities, plus land uses that, over time, may provide a foundation for future regional transit and commuter rail service.
- When additional study funds and new data are available, update the commuter rail ridership estimation model. Encourage the collection of local information for transportation studies.